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# CASE OF LARGE ORBITAL AND INTRA-CRANIAL IVORY EXOSTOSIS.

BY

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# ON A CASE OF LARGE ORBITAL AND INTRACRANIAL IVORY EXOSTOSIS—REMOVAL OF ORBITAL PORTION—DEATH THIRTY-TWO DAYS AFTER OPERATION—NECROPSY.

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Two reasons may be assigned for the publication of the following notes: first, cases of ivory exostosis of the orbit are comparatively rare; second, this particular instance was seen by a large number of visitors to the Moorfields Ophthalmic Hospital during the meeting of the International Medical Congress. Those who witnessed the operation will remember its difficulties, and may wish to know its result. The patient speedily rallied from the immediate effects of the operation, and progressed so satisfactorily for a month, that all anxiety seemed to be at an end. Thirty-one days after the operation he suddenly manifested symptoms of cerebral meningitis and died in a few hours. While I regret the fatal termination, I cannot conceal the fact that from the pathological standpoint, and, indirectly, from the clinical, the post-mortem examination furnishes lessons of greater value and importance than those afforded by the living case.

Herbert B., aged 25 years, an excavator, was admitted on July 26, 1881. It was stated that the left eyeball had been prominent for two years, and that the protrusion was steadily increasing. There was, however, no pain either in the eyeball itself or in the parts around.

On examination shortly after admission, the left globe was found to be pushed forwards, downwards, and outwards, by a growth of bony hardness occupying the upper and inner part of the orbit from the mid-orbital ridge to the situation of the lacrimal sac. The movements of the globe were not much

restricted, and the vision was normal $\left(V = \frac{20}{20}\right)$, notwithstanding the presence of well marked optic neuritis, characterised by great œdema of the papilla and enlargement and tortuosity of the veins.

The sight of the right eye was also normal.

After consultation with my colleagues, Messrs. Lawson and Couper, who confirmed the diagnosis of a bony tumour, I resolved to make an exploratory incision, and remove the growth if desirable. This I accordingly did on August 2.

The patient having been put under the influence of ether, I made an incision an inch and a half long through the skin and the orbicular muscle, along the superciliary ridge, and opposite the base of the tumour. The growth was found to be semiglobular in shape and of uniform hardness. It filled the upper and inner part of the orbit in front, and extended backwards as far as the finger could reach. After a brief consultation, in which I had the benefit of the personal experience of Dr. H. Knapp, of New York, I set to work to remove as much of the growth as I could. The periosteum was incised close to the orbital margin, and then stripped off the tumour from before backwards by means of a raspatory. Several ineffectual attempts were made to penetrate the base of the growth, first with a gouge, and afterwards with highly tempered steel chisels and a mallet, but the bone was so hard that no impression could be made on it; the edges of the chisels were soon spoiled. I then had recourse to a drill worked by a powerful Archimedean screw. By means of drills of various sizes I managed to bore a large number of tunnels in various directions through the base of the growth, parallel with the upper and inner walls of the orbit. I then cut through the narrow bony septa, between the borings, with a stout carpenter's chisel. When the chisel had made its way deep enough to act as a wedge, I gave a few energetic blows with the mallet, and succeeded in breaking off the whole of the orbital portion of the growth. When this was accomplished the orbital cavity seemed almost normal in size and shape, though it was obvious that a large mass forming the base of the growth still remained behind. As the operation had lasted nearly two hours, it was deemed unadvisable to prolong it in order to get away the remainder of the growth. The cavity was syringed out with a

warm solution of carbolic acid (1—20), and a caoutchouc drainage tube was inserted. The lips of the wound were then brought together by means of silver wire sutures, and a moist carbolised compress was applied. The patient was carried to bed before he recovered from the anæsthetic.

The piece of bone removed was as large as half a good-sized walnut, and was so dense that fragments of steel from the broken chisels and gouge were firmly imbedded in the surface of section, which was as smooth and bright as polished ivory.

No constitutional reaction followed the severe and prolonged operative procedure. The pulse and temperature did not transcend the normal limits. Sleep was tranquil, and the appetite continued unimpaired.

Next morning, with the exception of some listlessness, the patient's manner seemed unchanged. Then, as on succeeding days, the wound was kept thoroughly drained by means of the rubber-tube, and was syringed out twice a-day with a solution of carbolic acid (1—40). A carbolised compress was, in addition, kept constantly applied over the lips of the wound.

A week after the operation the man got out of bed, and seemed to be in perfect health. The discharge from the wound gradually diminished, and the inflammatory swelling steadily subsided.

Three weeks after the operation there was scarcely any discharge from the wound, and no pain or discomfort. Though the swelling opposite the inner angle of the orbit had grown less, it was noticed that the protrusion and displacement of the globe remained unaltered. The movements were, however, freer than before the operation.

The progress of the case continued to all appearance satisfactory, and altogether devoid of anxiety and trouble, till the morning of September 2, or exactly one calendar month from the day of operation.

On September 1st the man had been exercising as usual in the ward and in the out-buildings of the Hospital, seemingly in perfect health and strength. At 8 P.M. he complained of slight pain at the top of his head. This he himself ascribed to cold. He had a disturbed night, and at 10.30 next morning his temperature suddenly rose to 102° F., and the

pnlse went up to 80. The skin was dry, the tongue was clean, and the bowels were free.

I saw the case at mid-day, and found a little increase of swelling abont the wonnd, and thinking that pus might be pent up, I opened up the wound gently with a large probe. I failed to discover any great collection of pus, though a small quantity of dirty-looking shreddy fluid followed the withdrawal of the probe. The wound was gently syringed with the carbolic lotion and the compresses were renewed.

At 9 P.M. there was sudden exacerbation of the headache with occasional rigors. The temperature was 103° F., pulse 60, but very irregular. Ice was applied to the head. Shortly afterwards unconsciousness supervened, and at 11 P.M. profound coma set in, with stertorous breathing, and occasional slight convulsive attacks, equal on both sides. There was no hemiplegia or paralysis of the facial or ocular muscles. The pupils were not dilated, but were equal, and acted to light. At midnight the pulse was 120, full and bounding, and the respiration was laboured. Half-an-hour later the man died. There was no convulsion for about an hour before death.

*Necropsy*, September 3, fifteen hours after death.

Body muscular and well nourished. Above the inner canthus of the left eye was a circular opening which had been occupied by drainage tube, and which led down to bare bone, where tumour had been chiselled off. On removing the calvaria it was found that the greater part of the exostosis was in the left anterior cranial fossa. It had originally sprung from within the left frontal sinus, and had grown chiefly upwards. The roof of the sinus was in part extended over the tumour, and in part absorbed by it. In the frontal sinus were a few semi-transparent polypoid growths. The bony growth reached one inch above the orbital plate of the frontal bone, and extended for that distance into the left anterior lobe of the brain. It measured two inches from before backwards. It also sent a prolongation about half-an-inch long downwards into left side of the nasal cavity, and this portion was broken off the remainder of tumour, apparently at the time of the operation. Backwards, the growth had forced its way into the inner end of the great sphenoidal fissure. The cut surface of the growth had numerous bits of steel embedded in it. The growth was

capable of being slightly moved. There was no marked increase of subarachnoid fluid. There was general basilar meningitis, with a little lymph in the fissure of Sylvius and at the anterior part of the pons Varolii.

The brain in immediate contact with the tumour was in a state of red softening, being semi-fluid, with some puro-lymph on its surface at the summit of the bony mass. The left olfactory bulb was involved in this focus of softening and degeneration. The left optic nerve was stretched across a groove in the growth at the posterior part. The tumour with the adjacent supercilliary ridge was removed, and the brain as well as the backs of both eyes and the optic nerves and chiasma were preserved for further examination.

The portion which had been removed by operation was claimed by relatives, who interred it with the body.

The microscopical examination of the optic nerve disclosed the presence of a certain amount of inflammatory cells in the intervaginal space, but without much distension. In the nerve itself were two tracts of inflammation in the midst of otherwise normal tissue (*see* Fig. 3). One of these extended from near the central vessels towards the pial sheath, though without distinct relations to either; the other was smaller, and situated on the opposite side of the central vessels midway between them and the sheath. In these inflammatory areas a few hypertrophied trabeculæ were to be seen, and the nerve-tissue was crowded and obscured by great numbers of nuclei.

*Remarks.*—The practical lesson taught by this case is that it is impossible by the orbital portion alone to judge of the real size and extent of an exostosis springing from the frontal sinus; and, consequently, that other indications must be sought for in considering the feasibility of removing the tumour by operative interference. Though the operation performed in this case may not have shortened life, it would be idle to pretend that it prolonged life.

Should another case of exostosis ever come under my care, I shall endeavour to ascertain the size of the growth and its probable extent within the cranium before deciding to complete the operation.

The difficulty of making any impression on an ivory exostosis with a chisel, saw, or trephine, is so great that several cases have been recorded in which the operation had been abandoned. Keate tried to remove one of these growths with a trephine, but had to desist on account of the hardness, and Sir A. Cooper attempted in vain to saw an ivory exostosis from the edge of orbit.*

Mackenzie† relates that in the year 1843 he witnessed a case similar to those of Keate and Cooper. A gouge, cutting pliers, rasp, and paring-knife were tried on the surface of the exostosis without effect. A chain-saw was then applied, but would not work. Finally, with a Hey's saw a small portion of the growth was subsequently removed, with great difficulty. Ten years later, the exostosis remained exposed in the wound, and bore the marks of the saw "as if the operation had been done but yesterday."

It may interest some to know the sequel of this case. It is given in manuscript in one of the interleaves of the late Dr. Mackenzie's private copy of his work, which is in my possession by the favour of my esteemed friend and teacher, Mr. Wharton Jones, F.R.S.

The rough notes in Dr. Mackenzie's handwriting run thus :—"26th May, 1858. Five years since last report, patient was admitted into Eye Infirmary; exostosis much more protruded, much more movable, and pus copiously discharged from behind it. Without much trouble it came away. It is much necrosed, and of a very irregular form. The orbit felt entire after its removal, but evidently much displaced downwards, along with the eyeball, which was twisted outwards. The upper lid much shrunk and misshapen. No vision in eye. Cavity filled with lint. Cornea not so opake, I think, as it was. Long diameter of piece $1\frac{7}{8}$ inch. weighed 4 drams 2 scruples and 7 grains. The exostosis seems to have been developed between the inner and outer

* Quoted by Mackenzie, A Practical Treatise of the Diseases of the Eye, 4th ed., Lond., 1854, p. 47.

† *Ibid.*, p. 48.

table of os frontis, leaving a large cavern communicating with the right frontal sinus. The roof of orbit, or rather its lower table, is depressed, along with eyeball. The floor of orbit is half-an-inch below its proper level. Is now free from pain and expresses great relief by removal of exostosis. Piece of carious bone felt near frontal sinus. Parts granulating and healthy. Upper lid much shrunk and displaced."

Other cases have been recorded where the operation had to be given up. Dr. Knapp had to abandon the operation in one case. Seven weeks after the operation, the first five having been passed quietly and favourably, the patient was attacked with symptoms of meningitis of which she died.* Since that case Dr. Knapp has succeeded in removing the tumour on at least two occasions. In the last case an ivory exostosis as large as an English walnut was removed entirely by a process of "subperiosteal enucleation."† The osseous surroundings and connexions of the tumour were cut through with a narrow chisel and the mass shelled out from its periosteal coverings.

As I have already stated I had, during my operation, the benefit of Dr. Knapp's presence and counsel. I was, however, afraid to adopt the plan recommended by Dr. Knapp in so large a growth. The sequel of the case justified my fears. It would have been impossible to have removed the whole of the tumour by the subperiosteal method. Even after death, with the calvaria removed, it was only possible to withdraw the whole of the growth by sawing through the superciliary portion of the frontal bone. Nevertheless, in a demonstrably small exostosis, I readily admit that Dr. Knapp's method offers the best prospect of safe and effectual removal.

* Graefe's Arch. f. Ophth., viii, 1, p. 239, *et seq.*, and quoted by S. Wells, A Treatise on Diseases of the Eye, 3rd. ed, London, 1873, p. 722.

† Archives of Ophthalmology, vol. ix, pt. 4, New York, 1880, pp. 464—470.

## EXPLANATION OF THE FIGURES IN THE PLATE.

Figs. 1 and 2 show the actual size and relative positions and appearance of the growth on its outer and its inner aspects respectively. (The drawings have been inadvertently reversed by the engraver, and seem to represent right side instead of the left).

In Fig. 1 the atrophied shell of the orbital plate is seen forced upwards by the projecting growth. The optic nerve originally lay deeply imbedded in the groove immediately behind the horizontal portion of the orbital plate. The roughened surface below this process, and looking to the right of the figure, represents the surface from which the orbital portion of the exostosis was detached at the operation.

In Fig. 2 a smooth piece of the orbital plate or part of the ethmoidal bone is seen attached to the tumour about the centre. The part above this level was intracranial, and the smooth oval piece to the lower part, and the left side of the figure, lay within the nasal cavity.

Fig. 3 is a representation of the microscopical appearance of a section of the optic nerve. For a description see p. 5.

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*Fig. 2.*

*Fig. 1*

*Fig. 3*